REMARKS

I. Introduction

In response to the Office Action dated August 12, 2004, claim 4 has been cancelled and claim 1 has been amended. Claims 1-3 and 5-26 remain in the application. Re-examination and re-consideration of the application, as amended, is requested.

II. Prior Art Rejections

A. The Office Action Rejections

On page (2) of the Office Action, claims 1 and 4-7 were rejected under 35 U.S.C. §102(e) as being anticipated by Westbrook et al., U.S. Patent No. 6,320,688 (Westbrook). On page (3) of the Office Action, claims 2-3 and 8 were rejected under 35 U.S.C. §103(a) as being unpatentable over Westbrook in view of Coldren, U.S. Patent No. 4,896,325 (Coldren).

Applicants' attorney respectfully traverses the rejections in light of the amendments above and the arguments below.

B. Applicants' Independent Claim

Independent claim 1 is directed to a tunable laser source comprising

a widely tunable semiconductor laser comprised of an active region on top of a thick, low bandgap, single common waveguide layer, wherein both the waveguide layer and the active region are fabricated between a p-doped region and an n-doped region; and

an electro-absorption modulator integrated into the semiconductor laser, wherein the electro-absorption modulator shares the waveguide layer with the semiconductor laser, and the waveguide layer is designed to provide high index tuning efficiency in the laser and good reverse bias extinction in the modulator.

C. The Westbrook Reference

Westbrook describes an optical transmitter that includes a directly modulated semiconductor laser and a non-linear optical intensity modulator which is connected in series with the output of the laser. High frequency analogue modulating signals are applied both to the laser and to the modulator. The modulator has a transfer characteristic such that it cancels

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intermodulation distortion in the output from the laser, to give a source with an improved dynamic range. The transmitter is suitable for use in an analogue optical distribution system for cellular radio.

D. The Coldren Reference

Coldren describes an improvement for allowing selective tuning of the emitted beam over a broad bandwidth to a diode laser having an active section for creating a light beam by spontaneous emission over a bandwidth around some center frequency and for guiding and reflecting the light beam between a pair of mirrors bounding the active section on respective ends thereof to create an emitted beam of laser light. The mirrors each have narrow, spaced reflective maxima with the spacing of the reflective maxima of respective ones of the mirrors being different whereby only one the reflective maxima of each of the mirrors can be in correspondence and thereby provide a low loss window at any time. The preferred mirrors each include a plurality of discontinuities to cause the narrow, spaced reflective maxima wherein the spacing of the discontinuities of one mirror is different from the spacing of the discontinuities of the other mirror so as to cause the wavelength spacing of the maxima to be different. Additionally, the preferred embodiment includes a vernier circuit operably connected to the mirrors for providing an electrical signal to the mirrors which will cause continuous tuning within a desired frequency band, an offset control circuit operably connected to the mirrors for providing a voltage signal to the mirrors which will shift the reflective maxima of the mirrors into alignment at a desired frequency mode, and a phase control circuit for adjusting the laser mode wavelength to be in correspondence with the low loss window.

E. The Applicants' Invention is Patentable Over the References

Applicants' attorney respectfully submits that the claims, as amended, are patentable over the references. Specifically, Applicants' claims recite limitations not shown in the references, taken individually or in combination.

Westbrook has two confinement (i.e., waveguide) layers: one for the electroabsorption (EA) modulator and one for the laser, as shown in Table 1 in col. 5 of Westbrook. The modulator's MQW absorber layer is grown on top of a first confinement layer, a spacer layer is grown on the absorber layer, and a second confinement layer for the laser is grown on the spacer

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layer. Consequently, the waveguide layers necessary for the laser are grown on top of the layers necessary for the modulator. No single common waveguide layer is used that serves as the confinement (waveguide) layer for both the laser and modulator. Applicant's claims, on the other hand, describe a single common waveguide layer for both the laser and the modulator.

In addition, Applicants' independent claim 1 has been amended to recite that "the waveguide layer is designed to provide high index tuning efficiency in the laser and good reverse bias extinction in the modulator." This limitation also provides a definition of the waveguide layer that distinguishes it from Westbrook, in which the "layers necessary to make a DFB laser [are] grown on top of the layers necessary to form an EA-modulator" (see, Westbrook at col. 3, lines 17-19). Westbrook has no "single layer" to perform functions in both the laser and modulator.

Moreover, Applicants' independent claim 1 also recites that the waveguide layer is "a thick, low bandgap, single common waveguide layer," which is different from Westbrook's relatively thin MQW EA-modulator layer, as recited at col. 2, line 67 - col. 3, line 1 of Westbrook.

Note also that Westbrook states, at col. 3, lines 21-30, that the "wavelength of the absorber layer was 1.5 μm, as required." An MQW absorber layer for an EA-modulator is well known to provide modulation for only a narrow range of wavelengths. The Applicants' claims, on the other hand, recite a widely tunable laser and a modulator that works over the wide range. Westbrook's MQW absorber layer for the EA-modulator would not provide waveguiding alone or wide wavelength modulation in the context of Applicants' invention.

Thus, the combination of Westbrook and Coldren teaches away from Applicants' invention. Moreover, the various elements of Applicants' claimed invention together provide operational advantages over the combination of Westbrook and Coldren. In addition, Applicants' invention solves problems not recognized by the combination of Westbrook and Coldren.

Consequently, Applicants' attorney submits that independent claim 1 is allowable over the combination of Westbrook and Coldren. Further, dependent claims 2-8 are submitted to be allowable over the combination of Westbrook and Coldren in the same manner, because they are dependent on independent claim 1, and thus contain all the limitations of the independent claim.

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In addition, dependent claims 2-8 recite additional novel elements not shown by the combination of Westbrook and Coldren.

III. Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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